This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of up-regulating the gene expression of bone morphogenetic protein-2 (BMP-2) in targeted tissue, comprising the steps of:

generating at least one specific and selective signal having a frequency from 30 kHz to 120 kHz that when applied to a field generating device operatively disposed with respect to said targeted tissue causes the generation of a field having an amplitude of about 2 to 40 mV/cm in the targeted tissue that is specific and selective for the up-regulation of the gene expression of BMP-2 in said targeted tissue as measured by mRNA when said field is applied to the targeted tissue containing said BMP-2; and

exposing the targeted tissue to the specific and selective field generated by said field generating device upon application of said at least one specific and selective signal thereto for a predetermined duration of time <u>from approximately ½ hour to 24 hours per 24 hour period</u> at a predetermined duty cycle from approximately 10%-100% so as to selectively up-regulate the gene expression of BMP-2 in said targeted tissue as measured by mRNA.

2. (Currently Amended) The method of claim 1 wherein the generating step comprises the step of selectively varying the amplitude <u>from about 2 to 40 mV/cm</u>, duration <u>from approximately ½ hour to 24 hours per 24 hour period</u>, duty cycle <u>from approximately 10%-100%</u>, frequency <u>from 30 kHz to 120 kHz</u>, and waveform of the specific and selective signal until the gene expression of BMP-2 in said targeted tissue as a result of exposure to the resultant specific and selective field as measured by mRNA in the targeted tissue is ~~substantially~~ increased.

3. (Previously Presented) The method of claim 1 wherein said generating step comprises the step of generating the specific and selective signal at a remote source and said exposing step comprises the step of applying the field generated by the field generating device upon application of said specific and selective signal thereto to the targeted tissue.

4. (Previously Presented) The method of claim 3 wherein the exposing step comprises the step of applying the specific and selective signal to at least one electrode, at least one coil, or a solenoid located near the targeted tissue.

5. (Previously Presented) The method of claim 4 wherein the exposing step comprises the step of applying the field generated by the field generating device upon application of said specific and selective signal thereto to the targeted tissue through one of capacitive coupling and inductive coupling.

6. (Previously Presented) The method of claim 5 wherein when the specific and selective signal is applied to said at least one electrode, said at least one electrode generates a capacitive coupling electric field, and when the specific and selective signal is applied to the at least one coil or solenoid, said at least one coil or solenoid generates an electromagnetic field or a combined field.

7. (Currently Amended) A method for treating at least one of a bone fracture, fracture at risk, delayed union, nonunion, bone defect, spine fusion, osteonecrosis, and osteoporosis, comprising the steps of:

generating at least one specific and selective signal having a frequency of 30 kHz to 120 kHz that when applied to a field generating device operatively disposed with respect to targeted tissue causes the generation of a field having an amplitude of about 2 to 40 mV/cm in the targeted tissue that is specific and selective for the up-regulation of the gene expression of bone morphogenetic protein-2 (BMP-2) in said targeted tissue as measured by mRNA when said field is applied to the targeted tissue containing said BMP-2; and

exposing the targeted tissue to the specific and selective field generated by said field generating device upon application of said at least one specific and selective signal thereto for a predetermined duration of time <u>from approximately ½ hour to 24 hours per 24 hour period</u> at a predetermined duty cycle from approximately 10%-100% so as to selectively up-regulate the gene expression of bone morphogenetic protein in said targeted tissue as measured by mRNA.

8. (Previously Presented) The method of claim 7 wherein the exposing step comprises the step of capacitively coupling or inductively coupling the specific and selective field to the targeted tissue.

9. (Previously Presented) The method of claim 7 wherein the exposing step comprises the step of applying one of an electromagnetic field and a combined field to the targeted tissue.

10. (Previously Presented) The method of claim 7 wherein the generating step comprises the step of generating an electric signal having a sine wave configuration, a duty cycle of approximately 50%, and a frequency of approximately 60 kHz, where the resultant specific and selective field has an amplitude of approximately 20mV/cm in the targeted tissue.

11. (Previously Presented) The method of claim 10 wherein the exposing step comprises the step of applying the specific and selective field to the targeted tissue for a duration of approximately 24 hours in a 24 hour period.

12. (Previously Presented) The method of claim 11 wherein the exposing step comprises the step of applying the specific and selective field to the targeted tissue for a 50% duty cycle of 1 minute ON and 1 minute OFF.

13. (Currently Amended) The method of claim 7 wherein the generating step comprises the steps of selectively varying the amplitude <u>from about 2 to 40 mV/cm</u>, duration <u>from approximately ½ hour to 24 hours per 24 hour period</u>, duty cycle <u>from approximately 10%-100%</u>, frequency <u>from 30 kHz to 120 kHz</u>, and waveform of the specific and selective signal until the up-regulation of the gene expression of BMP-2 as measured by mRNA in the targeted tissue by the resultant generated field is ~~substantially~~ increased.

14. (Canceled)

15. (Canceled)

16. (Currently Amended) A device for the treatment of at least one of bone fractures, fractures at risk, delayed unions, nonunions, bone defects, spine fusion, osteonecrosis, and osteoporosis, comprising a signal source that generates at least one specific and selective signal having a frequency of 30 kHz to 120 kHz and a field generating device connected to the signal source so as to receive said at least one specific and selective signal and that is operatively disposed with respect to targeted tissue, said field generating device upon receipt of said at least one specific and selective signal causing the generation of a field having an amplitude of about 2 to 40 mV/cm in the targeted tissue that is specific and selective for the up-regulation of the gene expression of bone morphogenetic protein-2 (BMP-2) in the targeted tissue as measured by mRNA, said signal source controlling and varying duration of time of application of said at least one specific and selective signal for a predetermined duration of time from approximately ½ hour to 24 hours per 24 hour period at a predetermined duty cycle from approximately 10%-100% so as to selectively up-regulate the gene expression of BMP-2 in said targeted tissue as measured by mRNA as a result of application of the specific and selective field in said targeted tissue.

17. (Original) The device of claim 16 further comprising a portable power unit that drives said signal source.

18. (Previously Presented) The device of claim 16 further comprising means for attaching the field generating device to the body of a patient in the vicinity of bone tissue.

19. (Original) The device of claim 16 further comprising means for attaching the signal source to the body of a patient.

20. (Previously Presented) The device of claim 16 wherein the field generated by application of said at least one specific and selective signal to the field generating device is applied to said targeted tissue via one of capacitive coupling and inductive coupling.

21. (Previously Presented) The device of claim 20 wherein the specific and selective signal has a sine wave configuration, a duty cycle of approximately 50%, and a frequency of approximately 60 kHz, where the resultant specific and selective field has an amplitude of about 20 mV/cm in the targeted tissue.

22. (Canceled)

23. (Canceled)

24. (Previously Presented) A method of determining a specific and selective signal that when applied to a field generating device cause the field generating device to generate an electric field in targeted tissue that up-regulates bone morphogenetic protein in the targeted tissue, comprising the steps of selecting a starting signal with a signal shape and frequency that when applied to said field generating device causes said field generating device to generate a field that is known to increase or suspected to affect cellular production of bone morphogenetic protein-2 (BMP-2), selectively varying a duration of application of said starting signal until a duration that provides a most significant increase in production of BMP-2 is found, selectively varying an amplitude of said starting signal until an amplitude that provides a most significant increase in production of BMP-2 is found, selectively varying a duty cycle of the starting signal until a duty cycle that provides a most significant increase in production of BMP-2 is found, and selectively varying the duration of an on-off interval of the duty cycle of the signal until an on-off interval that provides a most significant increase in production of BMP-2 is found.

25. (Previously Presented) A method as in claim 24, comprising the further steps of selectively varying a frequency and waveform of said starting signal, keeping other signal characteristics constant, until a greatest increase in the gene expression of BMP-2 as measured by mRNA is found.

26. (Previously Presented) The device of claim 16, wherein the field generating device comprises at least one electrode, at least one coil, or a solenoid.

27. (Canceled)

28. (Canceled)

29. (Currently Amended) A device for the treatment of at least one of bone fractures, fractures at risk, delayed unions, nonunions, bone defects, spine fusion, osteonecrosis, and osteoporosis, comprising a signal source that generates at least one specific and selective signal having a frequency of 30 kHz to 120 kHz and a field generating device connected to the signal source so as to receive said at least one specific and selective signal and that is operatively disposed with respect to targeted tissue, said field generating device upon receipt of said at least one specific and selective signal causing the generation of a field having an amplitude of about 2 to 40 mV/cm in the targeted tissue that is specific and selective for the up-regulation of at least one of the gene expression of bone morphogenetic protein-4, 5, 6, and 7 (BMP-4, BMP-5, BMP-6, and BMP-7, respectively) in the targeted tissue as measured by mRNA, said signal source controlling and varying duration of time of application of said at least one specific and selective signal for a predetermined duration of time from approximately ½ hour to 24 hours per 24 hour period at a predetermined duty cycle from approximately 10%-100% so as to selectively up-regulate the gene expression of BMP-4, BMP-5, BMP-6, and/or BMP-7 in said targeted tissue as measured by mRNA as a result of application of the specific and selective field in said targeted tissue.

30. (Canceled)

31. (Previously Presented) A method of determining a specific and selective signal that when applied to a field generating device cause the field generating device to generate an electric field in targeted tissue that up-regulates at least one of bone morphogenetic protein-4, 5, 6, and 7 (BMP-4, BMP-5, BMP-6, BMP-7, respectively) in the targeted tissue, comprising the steps of selecting a starting signal with a signal shape and frequency that when applied to said field generating device causes said field generating device to generate a field that is known to increase or suspected to affect cellular production

of BMP-4, BMP-5, BMP-6, and/or BMP-7, selectively varying a duration of application of said starting signal until a duration that provides a most significant increase in production of BMP-4, BMP-5, BMP-6, and/or BMP-7 is found, selectively varying an amplitude of said starting signal until an amplitude that provides a most significant increase in production of BMP-4, BMP-5, BMP-6, and/or BMP-7 is found, selectively varying a duty cycle of the starting signal until a duty cycle that provides a most significant increase in production of BMP-4, BMP-5, BMP-6, and/or BMP-7 is found, and selectively varying the duration of an on-off interval of the duty cycle of the signal until an on-off interval that provides a most significant increase in production of BMP-4, BMP-5, BMP-6, and/or BMP-7 is found.